Reporting uncertainty as standard errors around point estimates of values - a standard method and worked example.

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Note: This short note and accompanying tool is part of a wider piece of work by the authors addressing uncertainty around HRQoL values, from which two manuscripts are currently being prepared for submission. We are happy to share this aspect of our work in advance of those papers, and encourage all those reporting HRQoL values to incorporate the methods described here as standard practice in their reporting of value sets, as a small first step toward better accounting for wider sources of uncertainty relating to HRQoL values.

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1. Reporting uncertainty as standard errors around point estimates of values - a worked example.

We identified a wide range of sources of uncertainty around HRQoL values, deriving from study design, stated preference methods and choice of methods for modelling of values (Devlin et al 2023). Our scoping review (Abangma et al 2023) identified a small number of studies that have analysed and quantified some of these aspects of uncertainty, but in general these do not directly provide useful information to users of health state values in cost effectiveness analysis (CEA). For example, Ara and Wailoo (2011) have provided information on uncertainty around dimension and level-specific parameters for the UK EQ-5D-3L value set. However, to allow that information to be used in CEA requires uncertainty to be reported for health *states*, that is, for EQ-5D profiles that combine dimensions and levels.

Where health state values have been estimated using a regression model, an obvious solution, which does not appear to have been used or reported elsewhere, is to apply the standard formula for the standard error of a linear combination of coefficients from independent variables, $SE = x'\Sigma x$, where x is a vector of regression coefficients and Σ is the variance/covariance matrix. In principle, this can be used to estimate standard errors for any health state described by the HRQoL instrument, not just for the health states for which values have been observed. These estimates are no different conceptually to out-of-sample predictions made in other statistical models. Such standard errors represent only one form of uncertainty and are conditional on the underlying model being correctly specified. However, the general point is that this conditional parameter uncertainty is straightforward to quantify.

To illustrate this, we used the original data from the MVH study, downloaded from the UK Data Archive at the University of Essex (Williams *et al.* 1995). We replicated the MVH valuation data set and estimation model (MVH Group, 1995) and generated its variance/covariance matrix, reported in an Appendix, available from the authors. This replicated exactly the estimation model reported by Gray *et al.* (2011) and the covariance matrix reported by Ara and Wailoo (2011). However, there were some small differences compared to the MVH Group estimates, also noted by Gray *et al.* From this, we calculated standard errors (SEs) for all 243 profiles generated from the variance/covariance matrix, detailed in the Appendix.

The SEs are in the range 0.008171 to 0.012203, which is small compared to the range of values from - 0.594 to 1. As noted, these SEs are conditional on the model being correctly specified and may be sensitive to alternative model specifications. We are exploring this, and implementing a Bayesian model averaging procedure to demonstrate how model uncertainty (Draper 1995) and parameter uncertainty can be combined. In addition, these are SEs of the mean values and do not relate to the uncertainty in predicting the next observation. This may be important because in many cases the value sets are used in subsequent statistical analysis and therefore averaging occurs at two levels which inappropriately reduces the uncertainty. This may suggest a role for missing data (multiple imputation) approaches and the two-stage approach reported in the Gray *et al.* (2012) paper.

2. Model replication and covariance matrix for the MVH TTO value set.

The Measuring and Valuing Health (MVH) valuation data were downloaded from the University of Essex UK Data Archive (Williams *et al.*, 1995). The data set includes data from interviews of 3395 people, consisting of 370 variables. After exclusions for data considered not to be reliable, the TTO data contains 2995 observations of 43 variables, one for each of the health states valued by respondents. These data are reshaped to generate observations by health state with the EQ-5D profiles converted to binary variables including N3, a data set containing 35 964 observations of 13 variables.

The 2995 observations used in the modelling data cannot be directly identified from publicly available information. The main MVH study report (MVH Group 1995) has some ambiguities and inaccuracies in the description of how observations were excluded. We had access to the correct data set through a historical file, but comparing these cases with the descriptions in the MVH report, we found 5 cases that should have been excluded according to the description but were not and 23 that were excluded but should not have been. Gray *et al.* (2011) reported the same issue in replicating the MVH results.

The model was estimated using the *nlme* package in R (version 4.2.2 (2022-10-31) - "Innocent and Trusting"), with the coefficients and standard errors shown in the following table:

Table 1: Coefficients and standard errors from replicated MVH Group valuation model

Variable	Coefficient	Standard Error
Mobility Level 2	0.0686	0.0051

Mobility Level 3	0.3133	0.0065
Self Care Level 2	0.1035	0.0054
Self Care Level 3	0.2133	0.0066
Usual Activities Level 2	0.0360	0.0062
Usual Activities Level 3	0.0944	0.0073
Pain & Discomfort Level 2	0.1226	0.0051
Pain & Discomfort Level 2	0.3847	0.0057
Anxiety & Depression Level 2	0.0711	0.0053
Anxiety & Depression Level 3	0.2365	0.0059
N3ª	0.2693	0.0071
Intercept ^b	0.0806	0.0078

Notes: (a) N3 is defined as a binary variable identifying health states that contain a Level 3 in at least one dimension. (b) the intercept can be interpreted as a binary variable identifying health states that contain a Level 2 or 3 in at least one dimension.

This is identical to the estimates calculated by Gray *et al.* (2011), but has some small discrepancies with the published MVH model, which may be the result of using different statistical software: the MVH original used LIMDEP, while Gray *et al.* used Stata, which produces results identical to the R package used here. The following table shows the variance/covariance matrix that we calculated, which is also identical to that published by Ara and Wailoo (2011).

Table 2: Variance/covariance matrix from replicated MVH Group valuation model

	(Intercept)	MO2	MO3	SC2	SC3	UA2	UA3	PD2	PD3	AD2	AD3	N3
(Intercept)	6.07E-05	-3.66E-06	1.74E-06	-1.03E-05	-4.93E-06	-3.25E-06	-3.53E-06	-8.99E-06	-4.22E-06	-1.03E-05	-4.29E-06	-9.85E-06
MO2	-3.66E-06	2.61E-05	1.61E-05	-3.53E-06	7.80E-07	-2.01E-06	-6.51E-06	-4.19E-06	-4.79E-06	-4.10E-06	-2.96E-06	-8.00E-07
MO3	1.74E-06	1.61E-05	4.26E-05	-9.81E-06	-1.26E-05	-6.15E-06	-8.18E-06	-1.60E-06	-6.52E-06	-3.07E-07	-5.35E-06	-3.68E-06
SC2	-1.03E-05	-3.53E-06	-9.81E-06	2.90E-05	1.82E-05	-8.94E-06	-5.62E-06	-3.84E-06	-7.03E-07	4.54E-06	2.20E-06	3.62E-06
SC3	-4.93E-06	7.80E-07	-1.26E-05	1.82E-05	4.35E-05	-8.30E-06	-1.64E-05	-2.09E-06	-2.41E-06	-1.24E-06	3.20E-06	-2.97E-06
UA2	-3.25E-06	-2.01E-06	-6.15E-06	-8.94E-06	-8.30E-06	3.80E-05	2.80E-05	-9.45E-07	4.34E-06	-7.63E-06	2.87E-06	-1.59E-05
UA3	-3.53E-06	-6.51E-06	-8.18E-06	-5.62E-06	-1.64E-05	2.80E-05	5.29E-05	-1.80E-06	7.86E-06	1.43E-06	2.38E-06	-2.49E-05
PD2	-8.99E-06	-4.19E-06	-1.60E-06	-3.84E-06	-2.09E-06	-9.45E-07	-1.80E-06	2.63E-05	1.13E-05	-6.97E-07	-5.13E-06	5.56E-06
PD3	-4.22E-06	-4.79E-06	-6.52E-06	-7.03E-07	-2.41E-06	4.34E-06	7.86E-06	1.13E-05	3.21E-05	-1.44E-06	-1.63E-06	-1.28E-05
AD2	-1.03E-05	-4.10E-06	-3.07E-07	4.54E-06	-1.24E-06	-7.63E-06	1.43E-06	-6.97E-07	-1.44E-06	2.81E-05	1.36E-05	-1.30E-06
AD3	-4.29E-06	-2.96E-06	-5.35E-06	2.20E-06	3.20E-06	2.87E-06	2.38E-06	-5.13E-06	-1.63E-06	1.36E-05	3.50E-05	-1.59E-05
N3	-9.85E-06	-8.00E-07	-3.68E-06	3.62E-06	-2.97E-06	-1.59E-05	-2.49E-05	5.56E-06	-1.28E-05	-1.30E-06	-1.59E-05	5.00E-05

3. Generating standard errors for the MVH value set

Using the standard equation SE = $x'\Sigma x$ (where Σ is the covariance matrix), standard errors can be calculated for the MVH value set for all 243 profiles defined by the EQ-5D-3L – see Table 3.

Fable 3: Values and standard errors	for profiles from replicate	d MVH Group valuation model
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	Value	SE		11212	0.812	0.009191		11313	0.32	0.009299
11112	0.848	0.008261		11213	0.378	0.00954		11321	0.433	0.010145
11113	0.414	0.009253		11221	0.76	0.009931		11322	0.362	0.010456
11121	0.796	0.008308		11222	0.689	0.009462		11323	0.197	0.009594
11122	0.725	0.00867		11223	0.255	0.009915		11331	0.17	0.010041
11123	0.291	0.009737		11231	0.228	0.009865		11332	0.099	0.010283
11131	0.264	0.009434		11232	0.157	0.009173		11333	-0.066	0.009847
11132	0.193	0.009543		11233	-0.008	0.009719		12111	0.815	0.00831
11133	0.028	0.008966		11311	0.556	0.009331		12112	0.744	0.009257
11211	0.883	0.009601		11312	0.485	0.009741		12113	0.31	0.010278

12121 0.692 0.008349 1333 0.28 0.00961 2232 0.189 0.00977 12122 0.621 0.009217 21111 0.779 0.00881 22331 0.003 0.00921 12131 0.166 0.01059 21112 0.779 0.008794 21122 0.656 0.008794 21121 0.727 0.00886 23111 0.037 0.0115 12121 0.779 0.009093 21131 0.125 0.009814 23131 0.0137 0.0115 12212 0.565 0.009024 21132 0.124 0.009513 23131 0.013 0.0115 12222 0.565 0.009024 21212 0.744 0.009541 23132 0.014 0.0133 12223 0.55 0.009044 21212 0.744 0.009541 23133 0.0166 12323 0.151 0.009564 21223 0.166 0.009543 23211 0.354 0.01061 12321 0.236										
12122 0.621 0.009217 21111 0.85 0.008917 12123 0.187 0.010351 21112 0.779 0.009845 12132 0.089 0.010594 21112 0.779 0.009845 12133 -0.076 0.009949 21122 0.656 0.009949 12121 0.779 0.009903 21122 0.656 0.009851 12212 0.788 0.009624 21131 0.124 0.009613 12222 0.585 0.009024 21131 0.124 0.009614 12222 0.585 0.009024 21131 0.0124 23122 0.012 12231 0.124 0.009678 21213 0.309 0.00954 23131 0.012 12312 0.314 0.010249 23131 0.012 23131 0.012 12321 0.329 0.009864 21221 0.868 0.00931 23211 0.331 0.01024 12331 0.0166 0.01038 21	12121	0.692	0.008349		13333	-0.28	0.009661	22322	0.189	0.009782
12123 0.187 0.010351 21112 0.779 0.008845 2233 -0.003 0.009855 12131 0.069 0.010594 21112 0.777 0.0089145 22332 -0.074 0.00985 12132 0.076 0.009949 21122 0.656 0.008914 23131 0.0117 12111 0.774 0.0098169 21131 0.113 0.009811 23131 0.01131 0.0117 12212 0.786 0.0099169 21131 0.113 0.009511 23121 0.244 0.0120 12221 0.558 0.009024 21212 0.743 0.009541 23131 0.0117 12231 0.124 0.009577 21222 0.626 0.009377 23212 0.26 0.00937 12331 0.0124 23331 0.01047 23331 0.01066 12332 0.035 0.010477 21222 0.626 0.00937 23212 0.26 0.00057 12331 0.10107	12122	0.621	0.009217		21111	0.85	0.008917	22323	0.024	0.008717
12131 0.16 0.010159 21113 0.345 0.009845 22332 -0.074 0.009845 12132 0.069 0.010694 21122 0.727 0.008791 22333 -0.239 0.00927 12211 0.779 0.009093 21123 0.222 0.008860 23111 0.367 0.01145 12212 0.774 0.009652 21132 0.124 0.009513 23112 0.244 0.0125 12221 0.656 0.009024 21133 0.041 0.009513 23121 0.024 0.013 12223 0.555 0.009632 21212 0.474 0.009661 23131 0.013 23121 0.019 0.01106 12233 0.124 0.009652 21212 0.671 0.009367 23131 0.331 0.0107 12311 0.452 0.009564 21223 0.186 0.009367 23212 0.28 0.01064 12321 0.329 0.009652 21313 0.416	12123	0.187	0.010351		21112	0.779	0.00888	22331	-0.003	0.009558
12132 0.089 0.010694 21121 0.727 0.008914 22333 0.239 0.00923 12211 0.776 0.009093 21123 0.222 0.00886 23111 0.367 0.01172 12212 0.708 0.009169 21131 0.195 0.009831 23112 0.226 0.01173 12212 0.565 0.009024 21133 0.041 0.009513 23121 0.240 0.0103 12222 0.555 0.009024 21121 0.743 0.009543 23131 0.011 23122 0.08 0.01064 12232 0.55 0.009564 21221 0.661 0.010249 23133 -0.010 23131 0.010 23121 0.331 0.01067 12311 0.452 0.009564 21223 0.68 0.009861 23212 0.26 0.00976 12321 0.331 0.010649 21323 0.15 0.00967 23211 0.36 0.00976 23212 0.26	12131	0.16	0.010159		21113	0.345	0.009845	22332	-0.074	0.009857
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12232 0.053 0.009464 21221 0.691 0.010249 23133 -0.255 0.01062 12311 0.452 0.009567 21222 0.62 0.009367 23211 0.331 0.01079 12311 0.452 0.00966 21232 0.159 0.010047 23213 0.0095 12321 0.329 0.009982 21233 -0.077 0.00966 23222 0.137 0.009951 12323 0.036 0.009652 21312 0.467 0.009554 23223 -0.028 0.01032 12331 0.066 0.010188 21313 0.251 0.009554 23232 -0.126 0.00953 12332 -0.055 0.010854 21322 0.293 0.009464 23311 0.273 0.00933 13111 0.436 0.010944 21332 0.128 0.00957 23313 0.027 23313 0.027 23313 0.028 23313 0.037 23313 0.037 0.00933	12231	0.124	0.009678		21213	0.309	0.009914	23132	-0.09	0.010604
12233 -0.112 0.009757 21222 0.62 0.009367 23211 0.331 0.01079 12311 0.452 0.009564 21223 0.186 0.00986 23212 0.266 0.00975 12313 0.216 0.009762 21231 0.159 0.010047 23213 0.009 0.00982 12321 0.329 0.009762 21333 -0.077 0.0096 23222 0.137 0.00951 12323 0.093 0.009652 21313 0.467 0.009533 23231 -0.055 0.01083 12333 -0.17 0.010214 21322 0.293 0.009864 23311 0.273 0.00937 13111 0.436 0.010894 21323 0.128 0.009053 23312 0.202 0.00937 13111 0.436 0.010941 21323 0.135 0.00967 23313 0.037 0.00937 13121 0.313 0.011574 21333 0.135 0.009255 23321 0.15 0.00937 13131 0.5 0.01057 22113	12232	0.053	0.009464		21221	0.691	0.010249	23133	-0.255	0.010626
12311 0.452 0.009564 21223 0.186 0.00986 23212 0.26 0.00977 12312 0.381 0.010409 21232 0.088 0.00976 23213 0.0096 23221 0.208 0.0103 12321 0.258 0.01073 21311 0.487 0.009554 23223 -0.028 0.0103 12323 0.093 0.009652 21312 0.416 0.009533 23231 -0.055 0.01033 12333 -0.05 0.010854 21323 0.364 0.009037 23331 -0.17 0.00933 13111 0.436 0.010941 21323 0.364 0.009053 23311 0.273 0.00933 13112 0.365 0.011067 21331 0.11 0.009659 23321 0.126 0.00953 13121 0.313 0.01162 2111 0.746 0.009495 23321 0.126 0.00953 13122 0.221 0.01057 22113 0.214 0.01049 23323 0.349 0.00943 13131 0.05	12233	-0.112	0.009757		21222	0.62	0.009367	23211	0.331	0.010793
12312 0.381 0.010409 21231 0.159 0.01047 23213 0.095 0.01083 12321 0.329 0.00976 21232 0.088 0.008919 23221 0.208 0.01073 12322 0.258 0.01073 21311 0.487 0.009554 23221 0.025 0.01057 12331 0.066 0.01088 21312 0.364 0.009533 23231 -0.055 0.01033 12333 -0.17 0.010844 21322 0.293 0.009663 23311 0.273 0.00933 13111 0.436 0.010894 21323 0.128 0.009653 23311 0.273 0.00933 13112 0.365 0.01007 21331 0.101 0.009769 23313 0.037 0.00933 13121 0.313 0.01577 21331 0.157 21331 0.021 0.010557 23323 0.164 0.009351 13131 0.5 0.010471 22122 0.52 0.008551 31111 0.333 0.164 0.01047 23232 0.188	12311	0.452	0.009564		21223	0.186	0.00986	23212	0.26	0.009772
12313 0.216 0.00976 21232 0.088 0.008919 23221 0.208 0.01073 12322 0.258 0.00982 21233 -0.077 0.00954 23222 0.137 0.00959 12323 0.093 0.009652 21313 0.487 0.009535 23231 -0.028 0.00937 12333 0.017 0.010854 21321 0.364 0.00937 23323 -0.202 0.00933 13113 0.436 0.010854 21323 0.128 0.009633 23311 0.273 0.00933 13111 0.436 0.010854 21323 0.128 0.009633 23312 0.202 0.00933 13112 0.365 0.010971 21333 -0.116 23313 0.37 0.00933 13122 0.242 0.01162 2111 0.746 0.00947 23321 0.15 0.00953 13132 0.021 0.010557 22121 0.675 0.009447 23331 -0.113 0.00913 13132 0.164 0.010471 22122 0.552	12312	0.381	0.010409		21231	0.159	0.010047	23213	0.095	0.010833
12321 0.329 0.009982 21233 -0.077 0.0096 23222 0.137 0.00999 12322 0.258 0.01073 21311 0.487 0.009554 23233 -0.026 0.010554 12333 0.005 0.010854 21312 0.346 0.009933 23232 -0.026 0.01035 12333 -0.07 0.010214 21322 0.293 0.0099846 23313 0.207 0.00933 13111 0.436 0.010894 21323 0.128 0.009953 23313 0.037 0.00933 13112 0.365 0.011007 21331 0.101 0.009769 23313 0.037 0.00933 13121 0.313 0.011574 21332 0.03 0.00965 23321 0.15 0.00933 13131 0.05 0.010577 22113 0.746 0.00895 23333 -0.348 0.00914 13132 0.044 0.010471 22122 0.552 0.008951 31111 0.336 0.01135 13221 0.64 0.010471 22133 <td>12313</td> <td>0.216</td> <td>0.00976</td> <td></td> <td>21232</td> <td>0.088</td> <td>0.008919</td> <td>23221</td> <td>0.208</td> <td>0.011023</td>	12313	0.216	0.00976		21232	0.088	0.008919	23221	0.208	0.011023
12322 0.258 0.01073 21311 0.487 0.009554 23223 -0.028 0.01058 12333 0.066 0.010188 21312 0.416 0.009533 23231 -0.055 0.01043 12333 -0.07 0.010214 21322 0.293 0.009846 23311 0.273 0.00937 13111 0.436 0.010894 21323 0.128 0.009053 23311 0.273 0.00937 13111 0.436 0.010894 21323 0.128 0.009053 23311 0.273 0.00937 13112 0.365 0.01107 21332 0.128 0.009652 23312 0.157 0.00937 13121 0.313 0.011574 21332 0.033 0.009467 23323 -0.018 0.00937 13132 0.077 0.010557 22111 0.746 0.00947 2333 -0.131 0.00937 13131 0.4 0.010471 22122 0.552 0.008551 31111 0.336 0.01135 13221 0.246 0.010471 22123 </td <td>12321</td> <td>0.329</td> <td>0.009982</td> <td></td> <td>21233</td> <td>-0.077</td> <td>0.0096</td> <td>23222</td> <td>0.137</td> <td>0.009956</td>	12321	0.329	0.009982		21233	-0.077	0.0096	23222	0.137	0.009956
12323 0.093 0.009652 21312 0.416 0.009533 23231 -0.055 0.01043 12331 0.066 0.010188 21313 0.251 0.009205 23232 -0.126 0.00921 12332 -0.005 0.010854 21321 0.364 0.009937 23233 -0.291 0.00933 13111 0.436 0.010894 21323 0.128 0.009663 23311 0.273 0.00933 13112 0.365 0.010941 21332 0.010 23313 0.037 0.00933 13121 0.313 0.011574 21333 -0.135 0.00965 23321 0.15 0.00933 13122 0.242 0.01162 22111 0.746 0.00941 2333 -0.38 0.00943 13132 0.021 0.010577 22113 0.241 0.010482 2333 -0.38 0.00943 13211 0.46 0.010471 22122 0.552 0.00855 31111 0.336 0.01136 13211 0.46 0.010471 22123 0.118	12322	0.258	0.01073		21311	0.487	0.009554	23223	-0.028	0.010587
12331 0.066 0.010188 21313 0.251 0.009205 23232 -0.126 0.00921 12332 -0.005 0.010854 21321 0.364 0.009937 23233 -0.291 0.01033 13111 0.436 0.010894 21323 0.128 0.00963 23311 0.273 0.00932 13112 0.365 0.01007 21331 0.101 0.009769 23313 0.037 0.00933 13121 0.313 0.011574 21332 0.03 0.00965 23321 0.15 0.00933 13122 0.242 0.01162 22111 0.746 0.00899 23323 -0.086 0.00933 13132 0.077 0.01168 22112 0.675 0.009447 2333 -0.148 0.00913 13131 0.5 0.010577 22113 0.241 0.010482 2333 -0.349 0.00914 13131 0.4 0.010471 22122 0.552 0.00855 2333 -0.349 0.00143 13221 0.277 0.01079 2213	12323	0.093	0.009652		21312	0.416	0.009533	23231	-0.055	0.01043
12332 -0.005 0.010854 21321 0.364 0.009937 23233 -0.291 0.01033 12333 -0.17 0.010214 21322 0.293 0.009846 23311 0.273 0.00933 13111 0.436 0.010894 21323 0.128 0.009053 23312 0.202 0.00933 13113 0.2 0.010941 21332 0.03 0.00965 23321 0.15 0.00933 13121 0.313 0.011574 21333 -0.135 0.00925 23322 0.079 0.00933 13122 0.242 0.01162 22111 0.746 0.00895 23323 -0.086 0.00933 13131 0.05 0.010577 22113 0.241 0.010482 23333 -0.186 0.00914 13132 -0.021 0.010577 22121 0.623 0.00855 23333 -0.349 0.00914 13221 0.277 0.010471 22122 0.552 0.008951 31111 0.336 0.0135 13221 0.277 0.010477 2213	12331	0.066	0.010188		21313	0.251	0.009205	23232	-0.126	0.009215
12333 -0.17 0.010214 21322 0.293 0.009846 23311 0.273 0.00936 13111 0.436 0.010894 21323 0.128 0.009053 23312 0.202 0.00936 13112 0.365 0.010071 21331 0.101 0.009769 23313 0.037 0.00936 13121 0.313 0.011574 21332 0.03 0.00966 23321 0.15 0.00936 13122 0.242 0.01162 22111 0.746 0.00899 23323 -0.086 0.00957 13132 0.077 0.01168 22112 0.675 0.009447 23333 -0.184 0.00907 13132 0.021 0.010577 22121 0.623 0.00855 23333 -0.349 0.00914 13131 0.164 0.010471 22122 0.552 0.008951 31111 0.336 0.01057 13212 0.277 0.01047 22123 0.118 0.010149 31112 0.265 0.01057 13222 0.206 0.01047 2213	12332	-0.005	0.010854		21321	0.364	0.009937	23233	-0.291	0.010314
131110.4360.010894213230.1280.009053233120.2020.00902131120.3650.011007213310.1010.009769233130.0370.00935131210.3130.011574213320.030.0096233210.1550.00935131220.2420.0116221110.7460.0089923323-0.0860.00897131230.0770.01168221120.6750.00944723331-0.1360.0093513132-0.0210.010577221130.2410.01048223332-0.1840.0090713132-0.0210.010471221220.5520.00855311110.3360.01135132120.3290.009431221310.0910.010188311120.2650.01057132120.2770.01072922130.0210.009677311220.2130.01049132210.2770.01074221210.6390.00914331131-0.0230.01077132220.2060.01047222130.2050.00966231132-0.1210.0107132310.0140.01079222130.2050.00966231132-0.2290.01031132310.1440.009344222220.5160.0085231131-0.2860.00976132320.2710.009378222210.5570.009499312210.2990.01053133110.3420.009	12333	-0.17	0.010214		21322	0.293	0.009846	23311	0.273	0.009362
131120.3650.011007213310.1010.009769233130.0370.00939131130.20.010941213320.030.0096233210.150.00939131210.3130.01157421333-0.1350.009255233220.0790.00939131220.2420.01162221110.7460.0089923323-0.0860.00897131310.050.010577221130.2410.01048223323-0.1840.00901213132-0.0210.010557221210.6230.008552333-0.3490.00914131310.40.010086221230.1180.010149311120.2650.01135132110.40.010086221230.1180.010149311120.2650.0155132120.2770.009431221310.0910.010188311130.10.01066132210.2770.010477222120.5520.00957311220.0230.01033132210.2770.010477221320.020.010331311210.2130.01066132220.0560.010477222130.2050.00966231132-0.0230.01077132320.0410.01056222220.5160.0085231131-0.0260.01077132320.0570.009378222310.0550.009499312130.0640.01033133110.1640.009378<	13111	0.436	0.010894		21323	0.128	0.009053	23312	0.202	0.009207
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	13112	0.365	0.011007		21331	0.101	0.009769	23313	0.037	0.009355
131210.3130.01157421333-0.1350.009255233220.0790.009303131220.2420.01162221110.7460.0089923323-0.0860.00897131230.050.010577221130.2410.01048223331-0.1130.009333131310.050.010577221210.6230.0085523333-0.1840.00903313132-0.0210.010557221220.5520.008951311110.3360.01133132110.40.010086221230.1180.010149311120.2650.01155132120.3290.009431221310.0910.010188311130.10.01066132130.1640.010417221320.020.010311311210.2130.01066132220.2060.01004722110.710.00950931123-0.0230.010933132230.0410.010566222120.6390.00914331131-0.0230.0107713232-0.0570.009378222210.5870.00882731131-0.0260.0107713232-0.2710.009364222320.0160.008827312210.1770.01046133110.3420.009473223110.3830.009413312220.1060.0105713323-0.1770.009438223120.3120.009433312210.1770.0166513331-0.044	13113	0.2	0.010941		21332	0.03	0.0096	23321	0.15	0.009536
131220.2420.01162221110.7460.0089923323-0.0860.00897131230.0770.011168221120.6750.00944723331-0.1130.00932131310.050.010577221130.2410.01048223332-0.1840.0090213132-0.0210.010557221210.6230.0085523333-0.3490.0091413133-0.1860.010471221220.5520.008951311110.3360.01135132110.40.010086221230.1180.010149311120.2650.01155132120.3290.009431221310.0910.010188311130.10.01066132130.1640.010417221320.020.010331311210.2130.01205132220.2060.01004722110.710.009509311220.1240.01205132230.0410.01056622120.6390.00914331131-0.050.0107713232-0.0570.00937822210.5870.00882731131-0.050.0107713232-0.2710.009364222320.0160.008827312210.1770.0146133110.3420.0096722233-0.1160.00926431223-0.0590.0105713323-0.0170.009438223120.3120.009433312210.1770.014613323-0.0170.00	13121	0.313	0.011574		21333	-0.135	0.009255	23322	0.079	0.009309
131230.0770.011168221120.6750.00944723331-0.1130.00933131310.050.010577221130.2410.01048223332-0.1840.0093313132-0.0210.010557221210.6230.0085523333-0.3490.0091413133-0.1860.010471221220.5520.008951311110.3360.01139132110.40.010086221230.1180.010149311120.2650.01155132120.3290.009431221310.0910.010188311130.10.01066132130.1640.010477221320.020.010331311210.2130.01205132210.2770.0107292213-0.1450.009677311220.1420.01205132320.0410.010566222120.6390.00914331131-0.0230.0107513232-0.0570.009378222130.2050.00966231132-0.1210.0107513233-0.2220.01035222230.0820.009199312120.2290.01036133130.1060.00936422232-0.0160.008827312210.1770.0146133210.2190.009672223130.1470.009264312220.1060.0105513323-0.0170.009438223120.3120.00941331223-0.0590.0105513323-0.017	13122	0.242	0.01162	-	22111	0.746	0.00899	23323	-0.086	0.008974
131310.050.010577221130.2410.0104822332-0.1840.0090213132-0.0210.010557221210.6230.008552333-0.3490.0091413133-0.1860.010471221220.5520.008951311110.3360.01139132110.40.010086221230.1180.010149311120.2650.01157132120.3290.009431221310.0910.010188311130.10.01066132130.1640.010417221320.020.010331311210.2130.01208132210.2770.01072922133-0.1450.009677311220.1420.01208132230.0410.010566222120.6390.00914331131-0.0230.0107713232-0.0570.009378222210.5870.00889931133-0.2860.00976132130.1640.009364222220.5160.00852312110.30.01082133130.1060.00936422232-0.0160.008827312210.1770.0146133210.2190.0096722233-0.1810.009264312220.1060.0109213323-0.0170.009438223120.3120.00941331221-0.0590.0105213331-0.0440.009529223130.1470.00929831231-0.0860.0105213332-0.115 <td< td=""><td>13123</td><td>0.077</td><td>0.011168</td><td></td><td>22112</td><td>0.675</td><td>0.009447</td><td>23331</td><td>-0.113</td><td>0.009326</td></td<>	13123	0.077	0.011168		22112	0.675	0.009447	23331	-0.113	0.009326
13132-0.0210.010557221210.6230.008552333-0.3490.0091413133-0.1860.010471221220.5520.008951311110.3360.01139132110.40.010086221230.1180.010149311120.2650.01157132120.3290.009431221310.0910.010188311130.10.01066132130.1640.010417221320.020.010331311210.2130.01208132210.2770.01072922133-0.1450.009677311220.1420.01220132230.0410.010566222120.6390.00914331131-0.0230.0107132310.0140.010179222130.2050.00966231132-0.1210.010713232-0.0570.009378222220.5160.00852312110.30.01082133110.3420.0094922233-0.1810.009264312210.1770.01146133210.2190.0096722233-0.1810.009264312220.1060.01093133220.1480.009873223120.3120.00940331231-0.0260.0105213331-0.0440.009529223130.1470.00928831231-0.0260.0105213332-0.1150.009657223210.260.00940231233-0.3220.00988	13131	0.05	0.010577		22113	0.241	0.010482	23332	-0.184	0.009013
13133-0.1860.010471221220.5520.008951311110.3360.01139132110.40.010086221230.1180.010149311120.2650.01157132120.3290.009431221310.0910.010188311110.3360.01139132130.1640.010417221320.020.010331311210.2130.01208132210.2770.01072922133-0.1450.009677311220.1420.01208132230.0410.010566222120.6390.00914331131-0.050.0107713232-0.0570.009378222210.5870.00898931133-0.2860.0097613233-0.2220.01035222220.5160.00852312110.30.01082133110.3420.009364222310.0550.009499312120.2290.01031133220.1480.00936422232-0.0160.008827312210.1770.01146133210.2190.009672223110.3830.00941331223-0.0590.0105213323-0.0170.009438223120.3120.00986331231-0.0860.0105213331-0.0440.009529223130.1470.00928831232-0.1570.0098813332-0.1150.009657223210.260.00940231233-0.3220.00988	13132	-0.021	0.010557		22121	0.623	0.00855	23333	-0.349	0.009143
132110.40.010086221230.1180.010149311120.2650.01157132120.3290.009431221310.0910.010188311130.10.01066132130.1640.010417221320.020.010331311210.2130.01208132210.2770.01072922133-0.1450.009677311220.1420.01220132220.2060.010047222110.710.00950931123-0.0230.0109132330.0140.010179222130.2050.00966231132-0.0230.0107013232-0.0570.009378222210.5870.00898931133-0.2860.00976133130.3420.009049222310.5550.009499312120.2290.01035133120.2190.00967222310.0550.009499312130.0640.01035133220.1480.009873223110.3830.009413312210.1770.014613323-0.0170.009438223120.3120.00986331231-0.0860.0105713324-0.1150.009657223130.1470.00929831232-0.1570.00986313332-0.1150.009657223210.260.00940231233-0.3220.009863	13133	-0.186	0.010471		22122	0.552	0.008951	31111	0.336	0.01139
132120.3290.009431221310.0910.010188311130.10.01066132130.1640.010417221320.020.010331311210.2130.01208132210.2770.01072922133-0.1450.009677311220.1420.01208132230.0410.010566222120.6390.00914331131-0.050.0107713232-0.0570.009378222130.2050.00966231132-0.1210.010713233-0.2220.01035222220.5160.00852312110.30.01082133110.3420.009049222310.0550.009199312120.2290.01035133120.2190.00936422232-0.0160.008827312210.1770.0144133210.2190.009672223110.3830.00941331223-0.0590.0105213323-0.0170.009438223120.3120.00986331231-0.0860.0105213331-0.0440.009529223130.1470.00929831232-0.1570.0098413332-0.1150.009657223210.260.00940231233-0.3220.00985	13211	0.4	0.010086		22123	0.118	0.010149	31112	0.265	0.011578
132130.1640.010417221320.020.010331311210.2130.01208132210.2770.01072922133-0.1450.009677311220.1420.01220132220.2060.010047222110.710.00950931123-0.0230.01093132310.0140.01079222130.2050.00966231131-0.050.0107013232-0.0570.009378222210.5870.00889931133-0.2860.0097613233-0.2220.01035222220.5160.00852312110.30.01082133110.3420.009049222310.0550.009499312120.2290.01033133120.2710.00936422232-0.0160.008827312210.1770.01446133210.2190.009672223110.3830.00941331223-0.0590.0105213323-0.0170.009438223120.3120.00986331231-0.0860.0105213331-0.0440.009529223130.1470.00929831232-0.1570.0098413332-0.1150.009657223210.260.00940231233-0.3220.00985	13212	0.329	0.009431		22131	0.091	0.010188	31113	0.1	0.010661
132210.2770.01072922133-0.1450.009677311220.1420.01220132220.2060.010047222110.710.00950931123-0.0230.01093132310.0140.010179222130.2050.00966231132-0.0230.0107013232-0.0570.009378222210.5870.00898931133-0.2860.0097613233-0.2220.01035222220.5160.00852312110.30.01082133110.3420.009049222310.0550.009499312120.2290.01036133120.2710.00936422232-0.0160.008827312210.1770.01146133210.2190.0096722233-0.1810.009264312220.1060.0109213323-0.0170.009438223120.3120.00986331231-0.0860.0105213331-0.0440.009529223130.1470.00929831232-0.1570.0098413332-0.1150.009657223210.260.00940231233-0.3220.00985	13213	0.164	0.010417	-	22132	0.02	0.010331	31121	0.213	0.012082
132220.2060.010047222110.710.00950931123-0.0230.01093132310.0410.010566222120.6390.00914331131-0.050.0107013232-0.0570.009378222130.2050.00966231132-0.1210.0107713233-0.2220.01035222220.5160.0085231133-0.2860.00976133110.3420.009049222230.0820.009199312120.2290.01030133120.2710.009364222320.0160.008827312210.1770.01146133210.2190.0096722233-0.1810.009264312220.1060.0109313323-0.0170.009438223120.3120.00943331231-0.0860.0105213331-0.0440.009529223130.1470.00929831232-0.1570.0098413332-0.1150.009657223210.260.00940231233-0.3220.00985	13221	0.277	0.010729	-	22133	-0.145	0.009677	31122	0.142	0.012203
132230.0410.010566222120.6390.00914331131-0.050.01070132310.0140.010179222130.2050.00966231132-0.1210.0107713232-0.0570.009378222210.5870.00898931133-0.2860.0097613233-0.2220.01035222220.5160.00852312110.30.01082133110.3420.00904922230.0820.009199312120.2290.01030133120.2710.009339222310.0550.009499312130.0640.01032133130.1060.00936422232-0.0160.008827312210.1770.01146133220.1480.009873223110.3830.00941331223-0.0590.0105213331-0.0440.009529223130.1470.00928831231-0.0860.0105213332-0.1150.009657223210.260.00940231233-0.3220.009853	13222	0.206	0.010047	-	22211	0.71	0.009509	31123	-0.023	0.010938
132310.0140.010179222130.2050.00966231132-0.1210.0107713232-0.0570.009378222210.5870.00898931133-0.2860.0097613233-0.2220.01035222220.5160.00852312110.30.01082133110.3420.009049222330.0820.009199312120.2290.01036133120.2710.00936422232-0.0160.008827312210.1770.01146133210.2190.00967222233-0.1810.009264312220.1060.0109213323-0.0170.009438223120.3120.00986331231-0.0860.0105213331-0.0440.009529223130.1470.00929831232-0.1570.0098413332-0.1150.009657223210.260.00940231233-0.3220.00985	13223	0.041	0.010566	-	22212	0.639	0.009143	31131	-0.05	0.010709
13232-0.0570.009378222210.5870.00898931133-0.2860.0097613233-0.2220.01035222220.5160.00852312110.30.01082133110.3420.009049222230.0820.009199312120.2290.01030133120.2710.009339222310.0550.009499312130.0640.01032133130.1060.00936422232-0.0160.008827312210.1770.01146133210.2190.0096722233-0.1810.009264312220.1060.0109213323-0.0170.009438223120.3120.00986331231-0.0860.0105213331-0.0440.009529223130.1470.00929831232-0.1570.0098413332-0.1150.009657223210.260.00940231233-0.3220.00985	13231	0.014	0.010179	-	22213	0.205	0.009662	31132	-0.121	0.010777
13233-0.2220.01035222220.5160.00852312110.30.01082133110.3420.00904922230.0820.009199312120.2290.01030133120.2710.009339222310.0550.009499312130.0640.01033133130.1060.00936422232-0.0160.008827312210.1770.01146133210.2190.0096722233-0.1810.009264312220.1060.0109313323-0.0170.009438223120.3120.00986331231-0.0860.0105213331-0.0440.009529223130.1470.00929831232-0.1570.0098413332-0.1150.009657223210.260.00940231233-0.3220.00985	13232	-0.057	0.009378	-	22221	0.587	0.008989	31133	-0.286	0.009766
13311 0.342 0.009049 22223 0.082 0.009199 31212 0.229 0.01030 13312 0.271 0.009339 22231 0.055 0.009499 31213 0.064 0.01033 13313 0.106 0.009364 22232 -0.016 0.008827 31221 0.177 0.01146 13321 0.219 0.009672 2233 -0.181 0.009264 31222 0.106 0.01092 13322 0.148 0.009873 22311 0.383 0.009413 31223 -0.059 0.01052 13323 -0.017 0.009438 22312 0.312 0.009863 31231 -0.086 0.01052 13332 -0.115 0.009657 22321 0.26 0.009402 31233 -0.322 0.00985	13233	-0.222	0.01035	-	22222	0.516	0.00852	31211	0.3	0.01082
133120.2710.009339222310.0550.009499312130.0640.01033133130.1060.00936422232-0.0160.008827312210.1770.01146133210.2190.0096722233-0.1810.009264312220.1060.010933133220.1480.009873223110.3830.00941331223-0.0590.0105213323-0.0170.009438223120.3120.00986331231-0.0860.0105213331-0.0440.009529223130.1470.00929831232-0.1570.00984313332-0.1150.009657223210.260.00940231233-0.3220.009853	13311	0.342	0.009049	-	22223	0.082	0.009199	31212	0.229	0.010303
13313 0.106 0.009364 22232 -0.016 0.008827 31221 0.177 0.01146 13321 0.219 0.009672 2233 -0.181 0.009264 31222 0.106 0.01092 13322 0.148 0.009873 22311 0.383 0.009413 31223 -0.059 0.01052 13323 -0.017 0.009438 22312 0.312 0.009863 31231 -0.086 0.01052 13331 -0.044 0.009529 22313 0.147 0.009298 31232 -0.157 0.00984 13332 -0.115 0.009657 22321 0.26 0.009402 31233 -0.322 0.00985	13312	0.271	0.009339	-	22231	0.055	0.009499	31213	0.064	0.010332
133210.2190.00967222233-0.1810.009264312220.1060.01092133220.1480.009873223110.3830.00941331223-0.0590.0105213323-0.0170.009438223120.3120.00986331231-0.0860.0105213331-0.0440.009529223130.1470.00929831232-0.1570.0098413332-0.1150.009657223210.260.00940231233-0.3220.00985	13313	0.106	0.009364		22232	-0.016	0.008827	31221	0.177	0.011464
13322 0.148 0.009873 22311 0.383 0.009413 31223 -0.059 0.01052 13323 -0.017 0.009438 22312 0.312 0.009863 31231 -0.086 0.01052 13331 -0.044 0.009529 22313 0.147 0.009298 31232 -0.157 0.009863 13332 -0.115 0.009657 22321 0.26 0.009402 31233 -0.322 0.009853	13321	0.219	0.009672		22233	-0.181	0.009264	31222	0.106	0.010914
13323 -0.017 0.009438 22312 0.312 0.009863 31231 -0.086 0.01052 13331 -0.044 0.009529 22313 0.147 0.009298 31232 -0.157 0.009853 13332 -0.115 0.009657 22321 0.26 0.009402 31233 -0.322 0.009853	13322	0.148	0.009873		22311	0.383	0.009413	31223	-0.059	0.010529
13331 -0.044 0.009529 22313 0.147 0.009298 31232 -0.157 0.00984 13332 -0.115 0.009657 22321 0.26 0.009402 31233 -0.322 0.00985	13323	-0.017	0.009438		22312	0.312	0.009863	31231	-0.086	0.010522
13332 -0.115 0.009657 22321 0.26 0.009402 31233 -0.322 0.00985	13331	-0.044	0.009529		22313	0.147	0.009298	31232	-0.157	0.009845
	13332	-0.115	0.009657		22321	0.26	0.009402	31233	-0.322	0.009857

31311	0.242	0.010461	32221	0.073	0.010094	33131	-0.264	0.0106
31312	0.171	0.0108	32222	0.002	0.009932	33132	-0.335	0.010552
31313	0.006	0.009906	32223	-0.163	0.009258	33133	-0.5	0.009972
31321	0.119	0.011049	32231	-0.19	0.009351	33211	0.086	0.010148
31322	0.048	0.011309	32232	-0.261	0.009096	33212	0.015	0.009465
31323	-0.117	0.010026	32233	-0.426	0.008847	33213	-0.15	0.009953
31331	-0.144	0.010495	32311	0.138	0.009707	33221	-0.037	0.010637
31332	-0.215	0.010698	32312	0.067	0.010511	33222	-0.108	0.009918
31333	-0.38	0.009776	32313	-0.098	0.009344	33223	-0.273	0.009948
32111	0.232	0.011213	32321	0.015	0.009959	33231	-0.3	0.009581
32112	0.161	0.011796	32322	-0.056	0.01068	33232	-0.371	0.00869
32113	-0.004	0.01068	32323	-0.221	0.009056	33233	-0.536	0.009199
32121	0.109	0.011589	32331	-0.248	0.00967	33311	0.028	0.008891
32122	0.038	0.012096	32332	-0.319	0.010339	33312	-0.043	0.009153
32123	-0.127	0.010601	32333	-0.484	0.009129	33313	-0.208	0.008611
32131	-0.154	0.010454	33111	0.122	0.011499	33321	-0.095	0.009355
32132	-0.225	0.010946	33112	0.051	0.011579	33322	-0.166	0.009531
32133	-0.39	0.009714	33113	-0.114	0.011071	33323	-0.331	0.008506
32211	0.196	0.009757	33121	-0.001	0.012012	33331	-0.358	0.008656
32212	0.125	0.009662	33122	-0.072	0.012031	33332	-0.429	0.008761
32213	-0.04	0.009449	33123	-0.237	0.011152	33333	-0.594	0.008171

While this worked example pertains to the UK value set for the EQ-5D-Y-3L, these same methods can be applied to the value sets for any HRQoL instrument.

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